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Leveraging Lean Principles and Value Stream Mapping In A Low Resource Setting:
The Jacaranda Health Approach

By

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Abstract

Jacaranda Health (JH), a start-up maternity health business operation, is building a network of private maternity clinics in resource-poor settings within third world countries. The goal is to provide affordable and quality care for the women and children in a patient-centered environment. Given this goal, and the limited resources available to both the organization and its clients, JH's business longevity and profitability relies on being innovative, adaptable, flexible and integrating the best clinical protocols, technologies, health information systems, and business approaches over the long run. To be successful in its vision and its business approach, quality improvement and management needs to be foundational to business practices at JH. As a first step, Lean, especially Value Stream Mapping (VSM) a quality management tool, was used to map out the business flows within and across business units. This paper focuses on quality management at Jacaranda Health, the VSM development processes and the associated activities in mapping and identifying both the services and business information flows within the clinic operations. It explores the current state, why VSM is needed, the roles and participants in the VSM workshop, how the clinical operation VSM was developed and its uses, the impact of VSM within JH's business, the challenges, and the best practices for moving forward with this model. JH is building a new clinic in another suburb of Nairobi and leveraging the lessons from the Ruiru clinic (used for this project) in the physical design, layout, and the associated clinical operation processes. JH is implementing a system wide Quality Improvement (QI) program, and putting in place a dedicated QI management resource. This resource will be available to lead all future VSM efforts and work cross functional across JH business units, coming up with processes that are well defined, repeatable, consistent, easily accessible and unambiguous to guide its operations.

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1.0 Introduction

Jacaranda Health (JH) is a start-up maternity health business operation building a network of private maternity clinics in resource-poor settings in third world locations. The goal is to provide affordable high quality maternity care in a patient centered environment. This goal and the limited resources of both JH and its clients necessitate an innovative and creative approach to business challenges to ensure patient satisfaction, longevity and profitability. To be successful, JH needs to be adaptable and flexible in integrating the best clinical protocols, technologies, health information systems, and Quality Improvement (QI) methods into its operations. Also important is to raise the standard of care among other private and public providers in East Africa. JH has made a lot of progress in establishing, staffing and providing a high quality, low cost maternity clinic in Ruiru, just outside of Nairobi Kenya. The clinic provides affordable community-based antenatal care and obstetric services to low-income women. JH aims to rapidly expand in the next few years to open multiple clinics in Nairobi and in other parts of Kenya and East Africa. To build capability for growth and replicability, JH's operations need to be standardized for better efficiency, effectiveness and scalability. Improving service provider skill level is a major area of focus for JH to be successful. To support these objectives, JH management decided to embark on a journey to leverage QI.

An important goal to JH is to be a learning organization- learning not just from its employee resource pool, but also from its clients as it creates a replicable maternal health model aimed at reducing cost, increasing uptake of health services, and improving quality

of care (IOM Report: The Path to Continuously Learning Health Care in America 2013). A streamlined, replicable maternal care model will be at the heart of JH operations. JH will require processes that are well defined, easily accessible and unambiguous to guide its operations.

JH management has identified QI using the Lean process improvement approach as a vehicle for achieving a robust, scalable, replicable and reusable operation model. Lean focuses on improving business value by streamlining process flow, identifying and eliminating redundancies. Value Stream Map (VSM), one of Lean's components, is the first stage in helping organizations identify and understand how their current processes work from the viewpoint of the customer. Without the insight VSM provides, it is difficult to successfully and systematically streamline workflows by identifying and eliminating redundant steps (Arthur 2011, Morgan & Brenig-Jones 2012). VSM is a pictorial representation of existing processes, getting organizations to consciously think about what they do, how they do it and what operational value it provides (Arthur 2011, Morgan & Brenig-Jones 2012). JH recognized that, Lean provided a platform through which its vision to consistently deliver maximum value to clients could be recognized. The VSM was the starting point through which the goals, QI culture, and the associated business processes and practices could be communicated internally and externally (Arthur 2011, Morgan & Brenig-Jones 2012, Tapping & Kozlowski 2009).

QI is important to JH because it provides an avenue for improvement and finding a delicately balanced tradeoff between providing quality service that is safe, at an affordable price. This equilibrium is very tricky to achieve for many businesses, and when achieved it

is even more difficult to consistently replicate and reproduce at will. JH is striving to be the standard of excellence in maternity care in a challenging and heavily constrained environment, recognizing the promise of QI, especially Lean in reaching the goal of safe delivery efficiently.

2.0 Quality in Healthcare

QI concepts and methodology traditionally have their roots in the manufacturing industry and the need to control production quality. In the 1950s, Feigenbaum, Juran, Deming and Ishikawa brought QI to the forefront and made huge gains in successfully leveraging QI methods in controlling manufacturing and production processes (Tapping & Kozlowski 2009). Based on the successes of QI in the manufacturing industry and the significant gains in the service industry, other industries like healthcare became interested in applying the same principles in their businesses. Many tools of quality have been carried over from manufacturing to other industries with varying success with Six Sigma, Lean, FMEA (Failure Mode Effect Analysis), Audit, Checklist, and Error Reporting leading the way (Chapman, Morgan & Brenig-Jones 2012). Despite an initially low success rate, QI techniques in healthcare are here to stay and many healthcare organizations are recognizing these as the new frontier in harnessing value by leveraging QI to increase customer satisfaction, employee loyalty and improving profit margin (Arthur 2011, Morgan & Brenig-Jones 2012). A good QI system should have leadership and organizational buy-in, be a continuous effort, make use of the appropriate tools and techniques, and be a human system (Arthur 2011, Tapping & Kozlowski 2009).

The application of QI methods to the healthcare sector in the USA began with Dr. Donald M. Berwick who is widely recognized as the father of QI in healthcare due to his pioneering work in improving healthcare quality. Berwick was interested in how quality control measures used in other industries such as manufacturing and service sectors could be applied in health care settings to improve the quality of healthcare delivery in the USA. He believed that leveraging the principles of continuous improvement, as many industries outside of healthcare sector have done for many years, would enable improvements in the healthcare delivery that balance the tradeoff between quality, safety and cost (Berwick, Godfrey & Roessner 2002). Many organizations in the US healthcare sector have embarked on QI journeys with highly successful results. These include the Mayo Clinic establishing QI activities in its clinical setting for physicians, the Cincinnati Children's Hospital recognizing the need to build an organization's capacity to execute improvement, Virginia Mason's Hospital excellent performance in improving patience safety and patience experience, and Theda Care's patient flow redesign to deliver maximum value to clients. While QI has become more mainstream with record of many successful QI projects in western countries, the story is quite different in many Low/Medium Income Countries (LMIC). The gap in health outcomes between high and low-income countries is wide and increases everyday. As possible ways to narrow this gap, many different approaches have been taken. These include the Millennium Development Goals (MDGs), which set targets for improving health outcomes, and various other global health improvement initiatives spearheaded by Nongovernmental Organizations (NGOs) (Sollecito 2011). In Low/Middle-Income countries (LMIC), such as Kenya, India, Nigeria, etc., the issues go beyond providing a customer centered service and improving profits as these low resource countries are often

challenged by the availability of basic resources, like supplies and prescription medicine, in the healthcare sector (Sollecito 2011).

There are many potential applications of QI in LMIC that can impact health outcomes but there is not much experience in how these can be leveraged. This paper describes a QI effort in a low income country, the application of Lean principles by JH in its Ruiru clinic in Kenya. It demonstrates that we could expect to see some significant improvements in health outcomes of resource poor countries through the skilled application of QI methods.

The use of tools and methodology are necessary to support making QI systemic across the organization. The IOM has identified a list of performance characteristics that should be the focus of any QI in healthcare. The IOM committee proposes six specific aims for improvement (IOM Report: Crossing the Quality Chasm 2001) that should be the objectives of QI efforts:

- **Safe** - avoiding injuries to patients from the care that is intended to help them.
- **Effective** - providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively).
- **Patient-centered** - providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.

- **Timely** - reducing waits and sometimes-harmful delays for both those who receive and those who give care.
- **Efficient** - avoiding waste, including waste of equipment, supplies, ideas, and energy.
- **Equitable** - providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socio-economic status.

QI tools, techniques and methodologies provide a vehicle for achieving these aims. Lean emphasis is on improving customer value by streamlining business process flow and eliminating waste. Lean is a QI tool that enables organizations to identify and understand how their processes work, streamline workflows by eliminating redundant steps, allowing them to consistently deliver the right product and services, at the right time, the right price, and the right quality (Morgan & Brenig-Jones 2012). Though it has its origin in the automotive industry, it has been proven and successfully used in the healthcare industry. Virginia Mason (VM) hospital in Seattle, WA became the poster child for how healthcare organizations have successfully leveraged Lean in the USA. Since 2007, Virginia Mason has received several awards on quality and excellence to date, especially in the areas of patient safety, patient experience and is consistently highly rated by the Leapfrog Group (The Leapfrog Group 2012) and the U.S. News & World Report (U.S. News & World Report 2013). The question is; "What is VM doing differently that sets it apart? What has earned VM the spotlight and made it the envy of similar health outfits in the USA? Why is VM consistently recognized for leadership in improving healthcare?"

Virginia Mason Medical Center is a non-profit regional healthcare system founded in 1920. It combines a primary and specialty care group practice of more than 440 physicians and 336-bed acute care hospital (AIAMC 2010). This is a fairly large medical operation, which adopted and integrated QI into its learning and operational practices, modeled after Toyota Lean manufacturing principles in 2002. Patient safety is the bedrock on which quality health care rests at Virginia Mason. "By focusing on protecting the patients from preventable harm, Virginia Mason is able to provide the highest quality and most appropriate care at the lowest cost possible" (Gary S. Kaplan CEO, VM News Release). In the words of Governor Chris Gregoire of WA state, the achievement of Virginia Mason is ground breaking, "As our country works through healthcare reform, we as leaders can take note that organizations such as Virginia Mason are proving high quality health care at a lower cost is not only achievable, but it should be an expectation."

Achieving high quality care at the lowest possible cost, the goal of many healthcare organizations, has been elusive. However, Virginia Mason has proven through the use of Lean QI principles that this is achievable. JH's vision is to be the VM of Kenya, or even in the continent of Africa, achieving similar successes by leveraging QI. Employing appropriate tools, techniques and methods in the successful implementations of QI projects cannot be underestimated. These do not have to be complex but must be consistent, systematic, and fully adopted across the organization. The success rate of tools and methods can vary depending on the culture and the state of the organization. For example, voluntary reporting will have more success in an organization where the culture is open and learning is important, than in one with a culture of "blaming". The important point here is that tools

and methodology do not work wonders by themselves; to be successful the QI effort has to complement tools and methodology with strong leadership support, organizational buy-in, system-wide thinking and local context adaptation.

One key area in which the gap must be closed is in disseminating existing research findings into the field and translating the recommendations from research into meaningful practice in the field. The core problem is that we still do not have a delivery system to implement the current body of medical knowledge that could save many lives (Barker et al., 2011). The LMIC need to become creative in utilizing QI in order to mitigate the risks of healthcare delivery in a prevailing atmosphere of poor facilities, constant lack of supplies and technology tools, expanding knowing-doing gap, and human resource limitations in the seeking and delivery of healthcare services (Sollecito 2011).

Adapting QI techniques to local context for applications in LMIC could make it possible to:

- Achieve better coordination of maternity care
- Improve joint decision making between care givers and mothers
- Achieve better outcome for childbirth complications like hemorrhage after childbirth, infections after childbirth, pre-eclampsia or eclampsia
- Provide access to training to enhance provider skills, making the system safer for mothers and their babies
- Achieve better overall value for service providers and their stakeholders.

3.0 QI in LMICs: Opportunity to Save Mothers' Lives

Lean has been successfully used in the healthcare sector in the US. Can the same principles be successfully applied in LMIC given their unique challenges? There has been

very limited publicized application of lean manufacturing principles in LMIC, either due to the fact that Lean is not widely used or that it is being used but not being documented or written about in journals. The collection of work that exists in this area on LMIC is limited at this point (Sollecito 2011).

Improving quality, improving access and coverage, and slowing the growth of healthcare costs have been major areas of focus for the US healthcare system over the years. A lot of gains have been made in increasing quality in these areas through improvements in efficiency, cost, and infection control. Despite the challenges of access to maternity care and constantly rising costs, maternal health remains steadily safe in the US. QI had not been used so much for maternal health in the US because deliveries are generally safe and there are mechanisms within the system to take care of complications. However, in LMIC, there is a great potential to use QI to save the lives of mothers in the event of pregnancy or childbirth complications. The LMIC healthcare challenges are many and the impact on the population is devastating, especially in the area of maternal health. The World Health Organization (WHO Media Center 2012) estimates that every day about 800 women die of complications related to pregnancy or childbirth, and that almost all of these deaths occur in developing countries (WHO Media Center 2012). These complications are not necessarily predictable, but most are treatable. Some of the complications that lead to maternal death are hemorrhage after childbirth, infections after childbirth, pre-eclampsia or eclampsia, and unsafe abortion. There are disparities in maternal health between higher and lower income women, between women in rural and urban areas, and between women in developing and developed countries (WHO Health Statistics and Health

Information Systems 2012). The harsh reality is that, "A woman's lifetime risk of maternal death – the probability that a 15 year old woman will eventually die from a maternal cause – is 1 in 3800 in developed countries, versus 1 in 150 in developing countries" (WHO Media Center 2012). Women in rural areas of Sub-Saharan Africa are among the most likely to die from pregnancy and childbirth complications. In spite of great progress made towards achieving other MDG goals, USAID states that maternal and newborn health in Kenya needs to improve the knowledge and skill of service providers to prevent and manage postpartum hemorrhage (PPH) (USAID Kenya County Brief 2012). Indeed, JH has identified improving service provider skill level at its maternity outfits, both inpatient and outpatient clinics, as a major area of focus to be successful.

The maternal mortality issues in LMIC can be examined through the 3-delays model, which is been proven to be a useful tool in identifying the points of delays in the management of obstetric complications. The 3-delays model focuses on the following;

1. Delay in seeking care due to associated cost, lack of understanding of pregnancy, poor customer experience, socio-economic status of women, and cultural beliefs.
2. Delay in reaching care due to long distance to health clinics and hospitals, accessible transportation and associated costs, and poor infrastructure.
3. Delay in receiving care – poor facility, lack of supplies, human resource issues and challenges of the referral process.

4.0 Developing the JH Value Stream Map

The third delay is the focus of the work in JH due to not only clinical expertise but also to its business operations. JH recognizes this but up till now did not have the

mechanism for examining service flow through its clinics and the connectedness of their other business functions and processes. The use of VSM in low resource healthcare setting by JH at its Ruiru clinic just outside Nairobi, Kenya, to deconstruct and understand its clinical operation will be examined. The leadership at JH was very supportive of the efforts in ensuring the VSM exercise could be conducted, making available needed resources across various groups.

In building the JH quality system, it was important to initiate the process by ensuring adequate buy-in from the JH management team, with overall executive support and program sponsorship from the CEO. The director of clinical operations at JH was also solidly onboard. Given the challenges of the past, the process standardization and consistency that Lean brought into the clinical operations environment could not come soon enough. There were in depth discussions at the senior leadership level to connect JH leaders with its QI vision and obtain buy-in at the senior management level. This group also engaged in extensive QI project prioritization discussions based on the overall impact of different projects to the business. Strategies for organization adoption of QI were explored, the impact analysis of QI projects on the different stakeholder groups was conducted.

QI training was provided at the clinic, laying the foundation for what QI is, why it is important, what it entails, what the participants need to understand as they embarked on this journey as an organization. The tools, methodology, and techniques supporting QI initiatives were explored. The employee expectation was set for the journey ahead and the immediate commitments were clearly detailed to create awareness of the level of resource need among the participants.

The Process walkthrough started with the community mobilizers at the mobile clinic (now phased out as this business model was not deemed viable). It provided an understanding of how mothers are recruited into the clinic through this channel. Many of the participants in the process walkthrough had never had the opportunity to experience how this process worked or experience the community interaction that occurs between the community mobilizers and women in the community. The group then proceeded to walkthrough all aspects of labor and delivery functions (inpatient clinic), including the housekeeping department, the kitchen and the pharmacy, ending up in the well baby outpatient clinic and front office function walkthroughs. The group had the opportunity to observe these different functions at work, take notes, ask questions, role play and interview some of the clients in real-time. The team was debriefed at the end of the walkthrough, sharing observations, surprises, and what new discoveries or new insights about the business. It was a powerful experience, it provided for transparency and cross-functional perspectives of the interfaces and overlaps that exist between the different roles and functions within the clinical operations environment. Although no mother participated in the walkthrough process, the project team engaged both inpatient and outpatient mothers at different stages of the project to share their experiences through interviews and process observations.

The VSM is a manual graphical depiction of the clinical operations workflow. It identifies all the tasks necessary in getting the work done, both value-added and non-value-added tasks. It maps all activities from the first point of entry into the clinical operations system to the very end, when the system is exited through a discharge or a referral; this final activity closes the clinical operation process. At JH, the VSM was constructed using flip

charts; post it notes and different color flipchart markers. The final product (clinical operations VSM) was reproduced in MS PowerPoint for documentation purposes. The team comprised of departmental representation across all of clinical operations, such as midwives, nurses, front office, pharmacy, kitchen, house keeping, nursing assistants, clinic manager, and the director of clinical operations. Along with these key clinical resources, personnel from other JH business units directly involved with the daily operations of the clinics such as marketing also participated in the VSM exercise. These team members work at the clinics on a daily basis and represent the body of working knowledge of the clinical operation process at JH. The VSM was created based on the knowledge, input, discussion, and process data provided by this cross-functional team.

JH mothers are important stakeholders; the core of JH business lies in the clinical services provided to this group of hardworking women. They are often the primary breadwinners in their families, working mostly as domestic helps, vegetable sellers or shop owners with not a whole lot of disposable income. They seek quality affordable maternity care in a friendly, welcoming and respectful environment. The VSM provides a tool that enables JH to understand how well it is meeting the need of this important stakeholder group. As a result of the VSM exercise, the referral process was identified as one needing immediate attention given current challenges and the severe possible negative outcome (demise of mother and baby) that can occur if not well managed. The JH team put in place a standardized, consistent referral process, along with a referral Standard Operating Procedure (SOP) to improve the mother's experience and outcome of this key process.

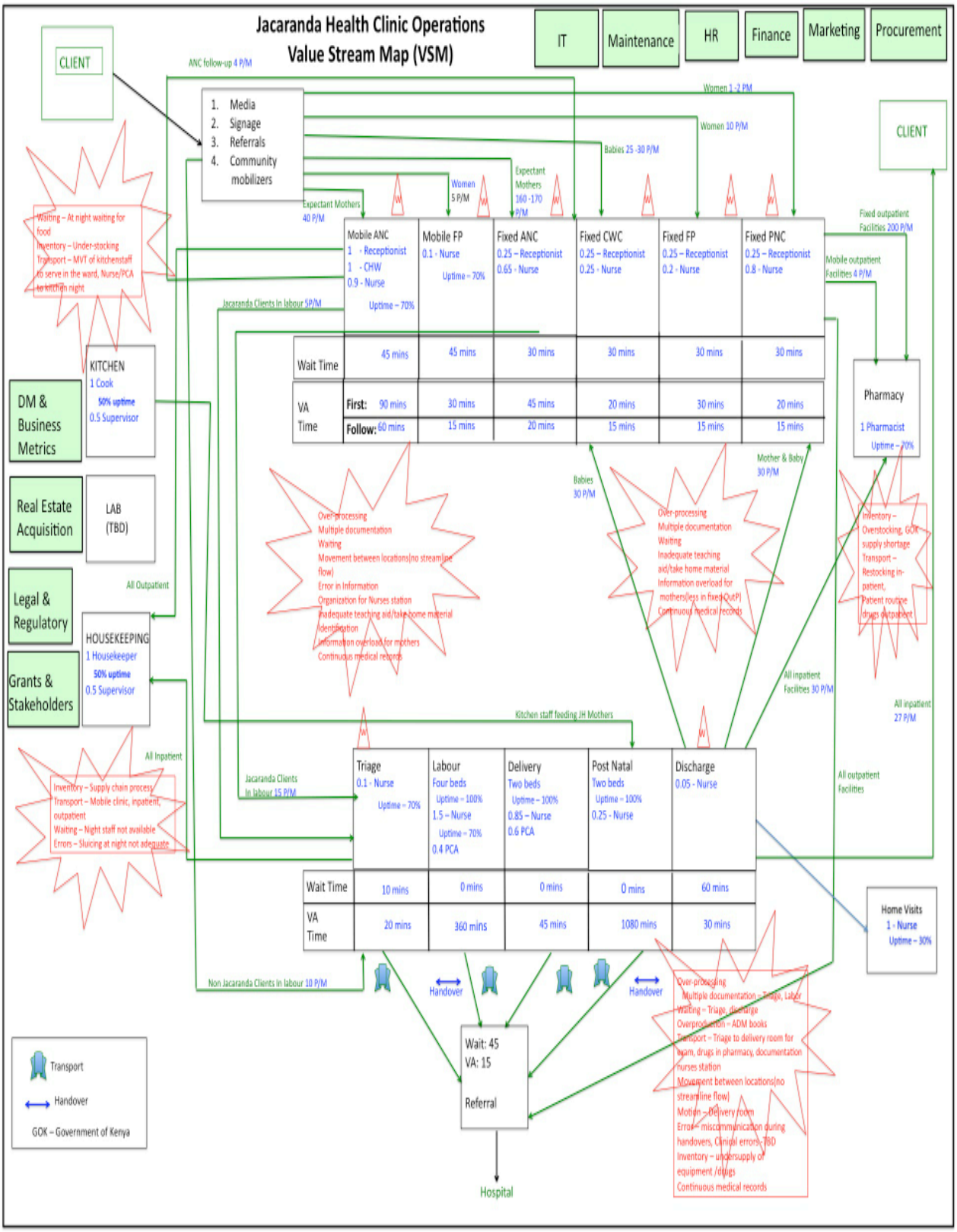

Figure 1 - JH Value Stream Map (VSM)

4.1 JH Clinical Operations Functions

In conducting the VSM (see figure 1) of JH clinical operations, both inpatient and outpatient functions were analyzed, including their boundaries and interfaces into other business functions, which support the clinical operation. The interfacing business operations include IT, Maintenance, HR, Finance, Marketing, Procurement, Data Management and Business Metrics, Real Estate Acquisition, Legal and Regulatory, and Grants and Stakeholders. It is necessary to understand the intersection with the boundary systems, the relationships, impact, and the nature of the interaction that needs to occur.

The outpatient clinic at JH offers four services: the Ante Natal Clinic (ANC), the Child Welfare Clinic (CWC), the Family Planning clinic (FP) and the Post Natal Clinic (PNC). The inpatient clinic is focused on the maternal delivery consisting of triage, labor and delivery, post natal, discharge, referral and home visits. The kitchen and housekeeping are important units facilitating the smooth running of the inpatient clinic. The internal pharmacy unit services both outpatient and inpatient clinic operations. These components of the system are represented as rectangular boxes, with wait time and value added time appended to the bottom of the box to indicate the workflow timelines of the functions.

4.2 JH Clinical Operations Work Flow

The JH VSM looked at how work gets done in clinical operations, following the workflow starting from the client's first point of entry into the system via any of the identified channels (media and signage advertising JH services, referrals or the community mobilizers). The VSM shows the flow of clients coming through these channels into both the inpatient and outpatient clinical processes. Along with the flow of clients coming in through the various channels, the VSM captures the information flow on the different types of clients and the associated volume of clients processed at each service point every month.

For example, the number of JH mothers attended at the inpatient clinic per month. The ideal client relationship for JH will be for the clients to enter the system (outpatient clinic) as early in the pregnancy as possible for maternity care and remain with the clinic through labor and delivery when client services is transferred from the outpatient to the inpatient clinic. The continuity of care afforded in this scenario will present the best outcome for both mother and baby. However, there is the recognition that clients do enter and exit the JH system at different points and stages of pregnancy. As indicated in the VSM diagram some clients only attend the outpatient clinic, some come into the inpatient clinic for labor and delivery, while others experience the end-to-end inpatient and outpatient services. Information flow is shown as a line with an arrow indicating the direction of the flow.

4.3 JH Clinical Operations Data

The VSM performance data also includes information regarding JH resources assignment and resource utilization i.e. number of people, roles and the skill level required to run the clinics and the associated uptime for these resources. Wait times are indicated for each process represented, where wait time is greater than zero, this is highlighted in a bright red small triangle with an inscribed "W" to signify a wait in the process. The pharmacy wait times have been incorporated into the wait times for both the inpatient and outpatient clinics interfacing with the pharmacy. Value added times is the time spent on an activity that the client is willing to pay for, for example, time spent by the midwife on consultation, examining the patient, collecting samples for lab testing, etc. The value added times for first time visit and follow up visits are different for the outpatient clinic (first time

visits takes longer), both are indicated on the VSM diagram. The inpatient clinic has only one set of value added time because the clients usually go through the labor and delivery system once; any follow-up visits after birth either happen at home or at the outpatient clinic.

4.4 JH Clinical Operations Improvement Opportunities

The starbursts capture process issues identified by the workshop participants for outpatient, inpatient, kitchen, housekeeping and pharmacy business units. The interconnectedness and dependencies between these units were clearly apparent during the VSM workshop discussions. The handover points in the processes are indicated with a blue line with arrows at both ends. These handover points often contribute to delays in the process. Transport indicates activities involving physical movement of clients or JH resources from one point to the other. Transport time problems were evident mostly in the inpatient clinic processes. This can be a critical source of delay in the process as seen with the referral process where from the time the request is made, there is at least a forty-five minute wait for an ambulance. JH does not have much control over this important constraint; this is dictated by the limited infrastructure of the emergency response company in relation to the physical location of the ambulance at the time a request is made. The VSM workshop team unearthed many issues within the clinic operations and in cross-boundary activities in the inpatient and outpatient clinic processes. The VSM workshop team identified opportunities for improvements in the inpatient referral process, outpatient wait times, the pharmacy inventory process and the inpatient kitchen process respectively given the limited resource availability and their relative business impact.

The referral process has created an ongoing problem for both the floor staff and management. Midwives often have to deal with client financial constraints in making referral decisions, in addition to the complex and stressful clinical conditions often involved in referral decisions. Having a standardized, consistent process, along with a referral SOP will help alleviate the anxieties of the referral process and improve the midwives' confidence in their referral decision-making process. The outpatient wait times issue was seen as important due to the anticipated growth in the coming months in clients accessing outpatient services, especially the ANC and CWC clinics. The process has to be robust enough to handle the expected increase in volume. While the benefits and the need to put other business operations through the VSM exercise at JH is clear, resource constraints continue to be an issue that JH tries to balance across its operations.

5.0 Conclusions – Next Steps and Ongoing Challenges

According to the IOM, "a health care system that is safe, effective, patient-centered, timely, efficient, and equitable would be far better at meeting patient needs." These are the goals of JH in providing maternity care services to low economic status women in Kenya. The organization is united behind these goals; Lean and VSM provide the vehicle for achieving these goals. It will take strong executive leadership, committed employees, standard processes, repeatable and consistent, along with adequate resource deployment to fully reap the benefit of its QI investments.

This initiative enjoys strong executive sponsorship and support; however, there are challenges and constraints with resource availability and within the larger country system.

Like many other organizations, resource availability is always a challenge, however, the QI process is important enough for JH management to willingly devote some of its scarce resources to the project-this is a huge win!

The JH QI project demonstrates that we could expect to see some significant improvements in health outcomes of LMIC through the skilled application of QI methods. Among the greatest needs for JH QI program are those for:

- A highly-skilled, motivated and effective resource pool
- The introduction of new planning tools
- Improve decision-making capabilities
- Empowerment
- Improved leadership skills

These could pose real barriers to the institutionalization and engraining of QI in JH. The JH executive leadership will need to invest in employee training to ensure they can compete in the current business climate. QI principles embedded in operations will ensure JH can create a more health enabling community for its clients, starting by working with a pool of human resource that is motivated, committed to the same vision, creative, flexible, adaptable and responsive to clients' needs in order to meet the challenges of the modern business environment-especially when it is in an old world in the process of transitioning to the new. The workforce and the executive leadership have to be open and candid enough to voluntarily report and address any identified operational errors and learn from these without any fear of recriminations. This level of trust building should be an area of focus for JH in laying the foundation, especially in a developing economy where jobs are in short

supply and people are constantly in fear of losing their jobs. An overall investment in communication and office support tools at the Ruiru clinic will also aid effective utilization of scarce human resources.

JH is currently in the process of establishing a second maternity clinic in another Nairobi suburb. It is leveraging the learning from its current operations, incorporating the clients' needs into the existing design as it replicates a maternal health model from the Ruiru clinic aimed at reducing cost, and addressing operational challenges in many aspects of the decision making for this new clinic. In exploring the impact of the current process flow on JH, human resource skill level issues (e.g. making quick decisions involving many variables such as clinical, financial, and personal, under stressful labor and delivery room conditions by midwives), combined with challenges in the referral process continue to have a negative impact on clinical outcomes. Midwives and other personnel involved in patient care need to be trained to deliver high quality, consistent, repeatable, skilled maternal health care to clients. JH is highly constrained in its referral processes by the level and quality of medical infrastructure available in Kenya, along with the challenges of the unpredictable nature of labor and delivery. This will be an important area where employees should effectively leverage organizational learning from the Ruiru clinic through process standardization and consistent process application. JH needs to work as best within this overall system constraints, delivering the best possible care when a referral is inevitable.

The need to leverage QI is recognized by JH leadership and it shows interest and commitment, however, the human resource, training, structure, infrastructure and foundation to support QI still need to be put firmly in place at JH. To be successful, the organization will:

- Need to engage all stakeholders and ensure communication is effective.
- Need to be deliberate in quantifying both tangible and intangible benefits of QI at every phase of implementation to justify future resource commitments.
- Need to slowly build out projects as it embarks fully on QI deployment across all its other business functions.
- It will be important to leverage some of the early adopters of QI within the clinical operations as foundation members for the new clinic to organically begin to institutionalize best practices at the new clinic as new staff are hired and trained.

JH is in the process of hiring a dedicated QI management resource to lead and work across functional divisions to identify, prioritize, and implement QI projects. This resource will be available to lead all future VSM efforts and work cross functional across JH business units to come up with processes that are well defined, repeatable, consistent, easily accessible and unambiguous to guide its operations.

This ambitious project will face competition for limited available resources, organizational issues regarding change among employees, and the environmental challenges of LMIC. It remains to be seen if the management commitment and the organizational resilience are strong enough in the face of these daunting challenges.

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